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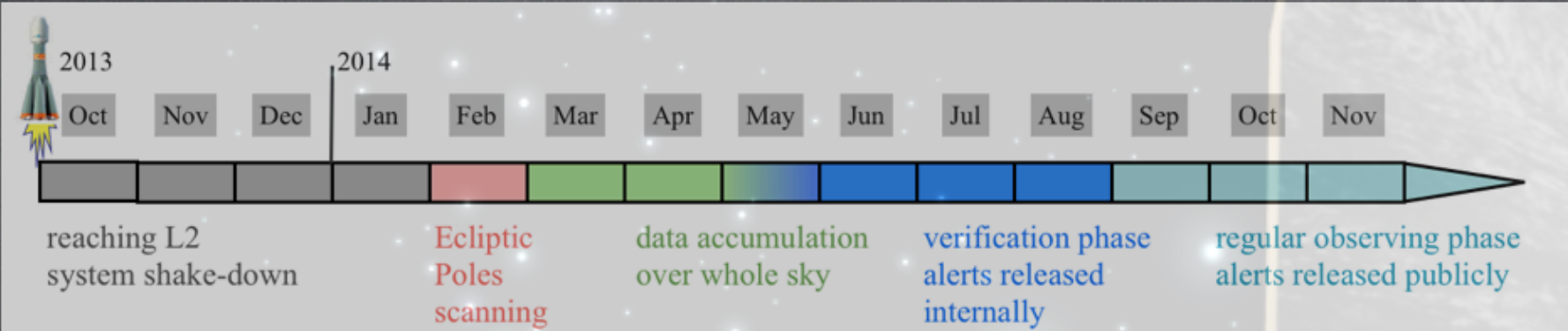
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# The Explosive Universe with Gaia

## ALERTS VERIFICATION AND PUBLICATION



Alerts from Gaia will be **publicly** available soon after the detection system is **verified** and **tested**. First alerts are expected **early in 2014** and those will be used for ground-based verification. **All facilities are invited to join the verification effort.**

Alerts will be published on a web page, via **Skylert.org** and via email. Each alert will contain coordinates, Gaia light curve and low-resolution spectra, classification and cross-matching results.

More on Gaia Science Alerts:  
<http://www.ast.cam.ac.uk/iaa/wikis/gsaawgwiki/>

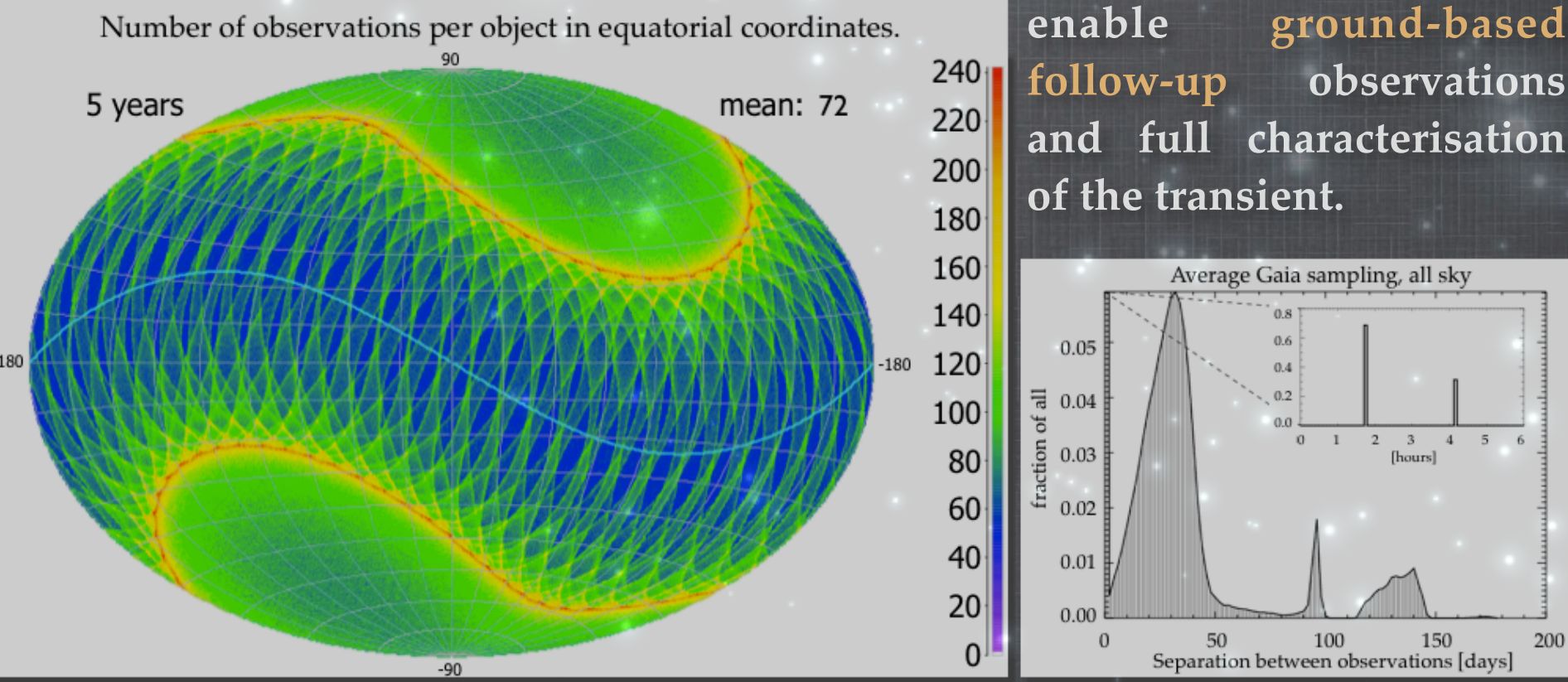


## GAIA SAMPLING AND NEED FOR THE FOLLOW-UP

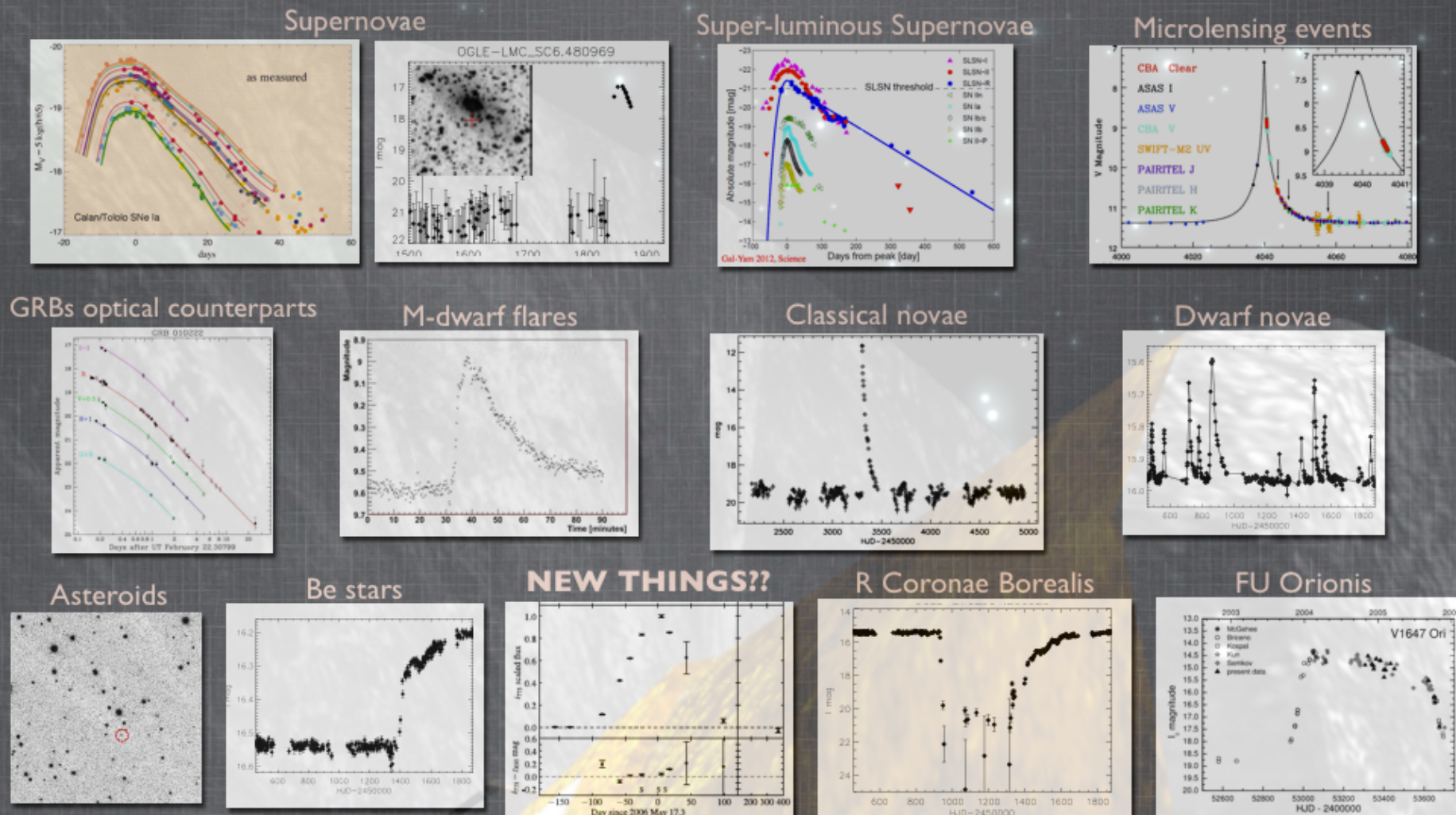
Gaia will observe the whole sky with a predefined pattern **from 40 to 200 times**. Typically, each object will be observed by both telescopes with a cadence of about **2 hours** and **4 hours** (Gaia has two fields of view), and then again after about **30 days**.

Such sparse sampling is perfect for detection, but not enough for detailed scientific studies. Therefore Gaia alerts will be made **public** immediately to

enable **ground-based follow-up** observations and full characterisation of the transient.



## TRANSIENT SKY BY GAIA



Gaia will detect a whole zoo of transients with outbursts on different time-scales and amplitudes. The **whole-sky, unbiased** survey will also be capable of alerting on unforeseen phenomena.

## ANOMALY DETECTION SYSTEM

Gaia data will be downloaded to the ground every day during 8h contact windows. Data analysis and anomaly detection will take place in **Cambridge, UK**. The alerts will be issued between **24 and 48 hours** after the observations.



The detection system is very simple:

- compare the most recent observations with the historic data
- inspect for unexpected changes
- no source history? - new transient!

Each alert will be then **classified** based on AF photometry and BP/RP low-resolution spectroscopy, and cross-matched with archival data.

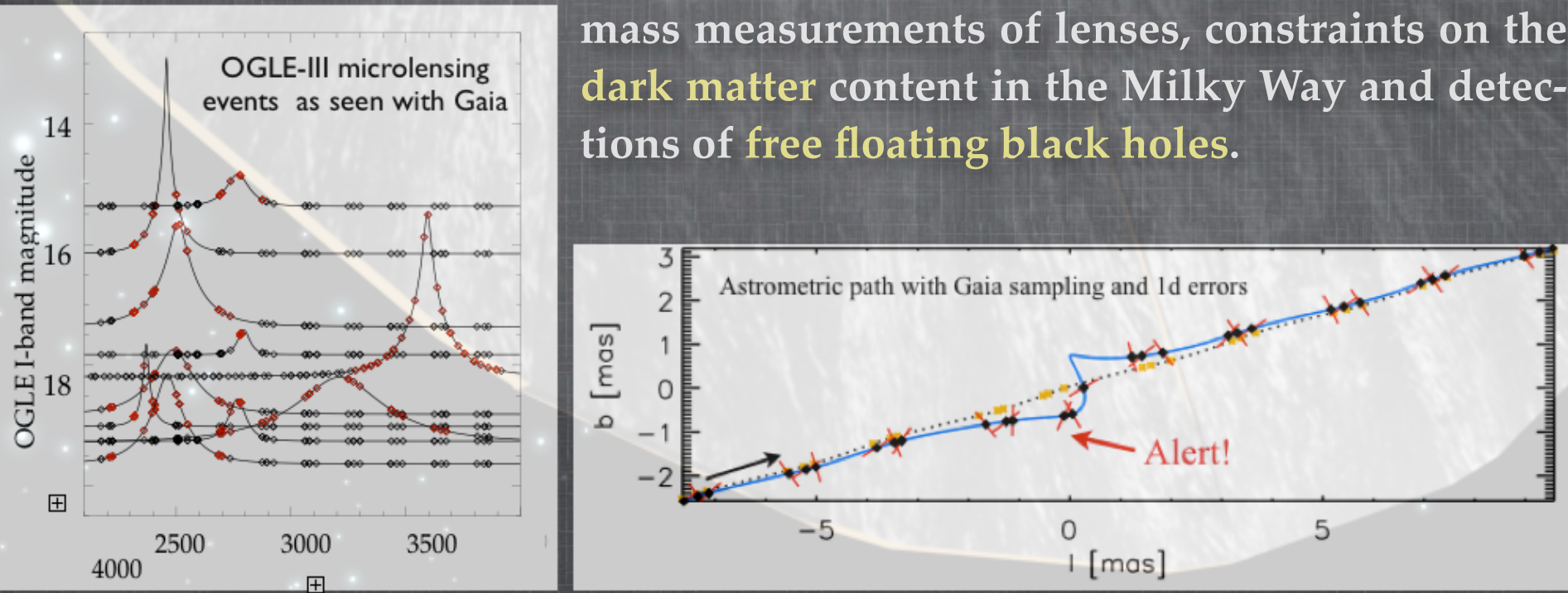
Known alerting targets will be added to the **Watch List**.

## HOW GAIA SEES A MICROLENSING EVENT?

Gaia will detect about **1000** microlensing events from all over the sky. Many events from the Bulge region will be observed infrequently as some data will be lost due to crowding. Without ground-based follow-up the events will be poorly covered.

With Gaia it will be possible, for the first time ever, to detect subtle (**<2 mas**) motion of the light centroid during these events. Astrometric microlensing, combined with Gaia and ground-based photometry, will provide unique

mass measurements of lenses, constraints on the **dark matter** content in the Milky Way and detections of **free floating black holes**.



## HOW GAIA SEES A SUPERNOVA?

There will be about **6000** supernovae detected to 19th mag over 5 years of the mission. Low resolution BP/RP spectrographs will allow for probabilistic classification of supernovae **types, redshifts** and **epochs**. Just a single detection might be enough to alert on a supernova, providing its full characteristic in early days of its evolution. **1/3** of all supernovae will be detected before their peak emission.

